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FINAL REPORT

ESTIMATES OF THE CITY OF ATHENS' ADDITIONAL ANNUAL EXPENDITURES WITH THE PROPOSED ROUTE 56 ANNEXATION

by

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Report prepared as part of the GROW Community Development Project, Jackson Area Extension Center, P. O. Box 32, Jackson, Ohio 45640.

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ESTIMATES OF THE CITY OF ATHENS' ADDITIONAL ANNUAL EXPENDITURES WITH THE PROPOSED ROUTE 56 ANNEXATION*

The proposed annexation area includes 194 acres along Route 56 west of the city of Athens. It runs approximately one mile from the city limits and includes two new schools being constructed on Route 56 and a new industrial park. A map of the area is shown in Appendix A.

The objective of this paper is to provide estimates of the additional expenditures accruing to the city of Athens if this area is annexed. The estimated changes in revenues are covered in a separate report.**

Given the undeveloped state of the art in estimating expenditures, should any quantitative estimates for the changes in expenditures be made? One school of thought is to avoid explicit estimates until more definitive estimation procedures are developed and more precise estimates can be made. However, if the city considers the fiscal impact of this proposed annexation, individual council members will need to implicitly, if not explicitly, make judgements concerning the magnitude of both expenditures and revenues. This report provides a range of expenditure estimates using several alternative estimation procedures and attempts to make explicit the procedures and assumptions used in deriving each alternative estimate.

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**See "Fiscal and Employment Impacts of Athens' Proposed Route 56 Annexation, by George Morse, October 1978.

Assumptions Used in the Analysis

The assumptions used to conduct the analysis of additional expenditures were:

(1) Current residents of Athens do not want to have the quantity or quality of their city services reduced as a result of the annexation.

(2) The quantity and quality of city services currently provided to the city residents would be provided if the new area is annexed.

(3) If the current quantity or quality of a city service is not as great as desired by some city residents, the costs of upgrading this service should be kept separate from the costs of providing the service to the new area.

(4) If the increase in revenues which the city receives from the area exceeds the increase in expenditures required to provide services, the net balance could be used to upgrade current service deficiencies in the city.

These assumptions allow a meaningful comparison of the changes in revenues and expenditures if the area is annexed.

If there is no actual increase in police expenditures following the annexation, it is obvious that the quantity and quality of the service provided to current residents will fall. Since the current police force would be required to spread their services over a larger area, the time available for the current city residents would fall. It is assumed that this is not desired by the current residents.

Obviously, if the level of city services provided in the annexation area exceeds the level currently provided in the city, the additional per capita costs will increase. It is assumed that, to the extent possible, the level of service provided in the new area will be the same as in the city.

To illustrate the third assumption, consider the addition of a police unit in response to current shortages in the city and that this unit also serves the annexation area. The additional cost must be divided between the area and the city in relationship to the additional demands created in the proposed annexation area.

Alternative Expenditure Estimation Procedures

This section describes four alternative estimation procedures used in this report. These include: 1) estimates by service department officials, 2) per unit cost estimates, 3) partial budgeting estimates, and 4) cross-sectional regression analysis estimates. This section of the paper reviews these alternative approaches to estimating the impacts of growth on local government expenditures and the advantages and disadvantages of each procedure.

Estimates by Service Department Officials

Several recent studies have estimated changes in local government expenditures by asking the head of each service department what additional personnel and equipment his department would require as a result of a particular type and amount of growth.[1]*

The advantage of this approach is that it encourages participation of service department personnel in the estimation of growth impacts. Each department head should be sufficiently familiar with his department to know: 1) whether excess capacity currently exists[2], and if so, 2) whether economies of scale could be realized if the service expanded[3], and 3) whether any unique circumstances are present. However, if explicit operational definitions of excess capacity and budgeting procedures for exploring economies

*Notes and references are at the end of the paper.

of scale do not exist, this may be an unrealistic expectation.

A weakness of estimates by local officials is that it is difficult to compare the estimates made to standard criteria. Do the estimates insure that the quality and quantity of service provided to current residents will be maintained? Or will the estimates result in existing personnel being distributed over a larger population, reducing the quality and quantity of services originally provided? How is output quality and quantity measured in the estimation procedure? There are few explicit standards or measurement procedures for judging the quality and quantity of public services. This makes these questions very difficult, even for those delivering the services.

There are sometimes incentives for the department heads to over or under estimate expenditure growth. This is especially the case when the department is inadequately staffed for the current population and is being asked to assume additional responsibilities.

A third drawback of this procedure is that it appears to under estimate the long term marginal expenditures. When local budgets are tight, department heads may expect no increase in their department's budget even if growth occurs. A static budget or a static number of personnel in the face of local growth may result in a reduction in service levels to current residents. If no excess capacity exists in the current level of service, then it is reasonable to expect a detrimental affect on service levels for current residents.

In examining this approach, Thomas Muller reports:[4/]

"This use of estimates by local officials and department heads to project future service costs has been shown to be extremely inaccurate in a retrospective analysis of the fiscal impact of a large development (10). Estimated costs, even taking inflationary pressures into account, sharply underestimated the increase in community budget.

The reliability of local agency estimates for a large area have also been examined as a part of a study of the fiscal impact of annexation. Additional personnel were projected by responsible departments for all major city services prior to annexation. Several years following the annexation these values were compared to actual number of personnel added (72). The data showed that, for some services, the estimates varied widely from the actual change. The additional number of personnel hired appeared to be strongly influenced by immediate budget considerations rather than by projected shift in service demand."

Per Unit Cost Estimates

A second means of estimating additional expenditures is to determine the average annual per unit cost or per capita cost for individual services. The total additional expenditure for each service is simply the product of the per unit expenditure and the number of new units.[5/] Alternatively, the per capita expenditure for the service times the number of new residents provides the estimate of additional expenditures.

Essentially, this procedure assumes that there is no excess capacity in the current services and that there are no economies of scale.[6/] It also ignores differences in expenditures per capita as a result of increases in income or changes in other socio-economic characteristics of the new residents. The primary advantage of this approach is its simplicity, low data requirements, and availability of information from local budgets.

Cross-Sectional Regression Analysis

In cross-sectional regression analysis the expenditures for each service are compared for different communities with data from the same year. Regression analysis allows the examination of the relationship between expenditures per capita and various factors which influence expenditure levels. Some of these include community population, the rate of growth of community population, income levels, age distribution, educational levels and other socio-economic characteristics. The development of a predictive formula by the use of regression analysis allows the projection of expenditures given local data on each of the independent variables. The regression coefficient of an independent variable shows the amount by which the dependent variable will change with the one-unit change in the independent variable, holding constant the influence of the other variables included in the analysis. The extent to which the variables included in the regression equation explain the total variation in the dependent variable is summarized in the square of the multiple correlation coefficient, commonly referred to as R^2. While the R^2 shows how closely related expenditures might be with a number of other variables, a regression equation cannot be interpreted to imply a cause and effect relationship. Rather, if it is known that a cause and effect relationship exists, regression analysis can be used to estimate the magnitudes of this relationship.[7/]

The primary advantage of cross-sectional regression analysis is that it is possible to examine a number of separate factors which might influence expenditure levels. Second, once the analysis

has been completed, the results can be used in a number of different jurisdictions. The results also provide a range of estimates through the confidence interval which allow researchers to predict the degree of accuracy of any projected changes.

The primary disadvantage with this approach is that it does not take into account unique circumstances within an individual community which might influence expenditures. For example, it cannot consider excess capacity which may exist in a community. If the analysis is to be done for each service, it also requires a large volume of data to be collected.

Budget Generator Estimates

Budget generators provide techniques for estimating the quantity of public services which will be demanded and procedures for estimating the costs and revenues of providing these services. Recently USDA's Economic Research Service has completed budget generators for several public services including: emergency medical services, fire protection, law enforcement, rental apartments, industrial sites.[8/]

The use of budget generators will provide more accurate estimates than any of the previous approaches. They require local data for estimating the demand for the service as well as estimating cost and revenue. Some of the budgeting generators allow alternative organizational and financial arrangements. The primary disadvantage of this approach is that it requires more detailed input and data than may be feasible in some projects. Most of the budget generators also have been developed for small rural communities in the Great Plains and need adaptation to other situations.

Additional Expenditures Along Route 56

This section provides estimates of the additional annual expenditures for municipal services in the proposed annexation area along Route 56. Several estimation procedures were used depending on the availability of data. In total, it is estimated that the annual expenditures would increase between $15,355 and $33,856 with an expected value of $21,992. The remainder of this section describes the procedure used to derive each estimate.

Police Protection

In September of 1978, 19 officers, 4 dispatchers and 1 secretary worked for the Athens City Police Department. Twenty-three officers are budgeted for 1978 with plans for two of the four vacancies to be filled during the coming year. The city is divided into three units for police protection. Unit 1 works in the downtown area and along West Union Street; Unit 2 works south of the Hocking River; and Unit 3 covers the north and east parts of the city.

Ohio University's security department has 19 uniformed full-time security personnel with 3 office staff. Six work study students also work part-time. According to Mr. Robert Gunn, the OU Security Department patrols 145 campus buildings and the Athens police are only called in for emergencies.

The sheriff's department has no responsibilities within the city on a regular basis but does provide assistance to the city police upon request for emergency situations.[9/]

It has been suggested that if this area is annexed, it might be desirable to create an additional unit to cover Route 56. This would require an additional 4 or 5 officers. Obviously only a small part of the additional cost could be allocated to the annexation area unless their service level is to be much higher than the rest of the city.

Police Chief Jones has stated that 25 is the minimum number of officers necessary to cover the city including the annexation area, with the major part of this expansion needed to handle curren inadequacy within the city.[10]/

The costs directly related to the expansion of city limits need to be estimated in order to compare the benefits and costs of annexation.

The proposed annexation would add approximately one mile of street and 200 new employees and residents to the city's responsibilities or increases of 1.7 and 1.0 percent respectively. An increase in the police department's expenditure of 2 percent and adjustment for the new contract of 22 percent would add $9123. This provides one estimate of the additional annual cost to serve this area.

These overlapping jurisdictions make it difficult to determine the actual ratio of the city officers/1000 permanent residents. Counting OU students and Athens residents equally, the authorized strength of 23 officers allows approximately 1.15 officers per thousand persons. Since the city only has emergency responsibilities on campus, the true ratio may approximate 2.3 officers per thousand population.[11]/ Due to the difficulty of determining an

accurate ratio, expenditure per capita estimates will vary widely depending on the assumptions used.

A second estimation procedure divides the cost of additional service into fixed and variable costs. The personnel costs of the police chief, captains, dispatchers, and secretary are considered fixed costs for the addition of this area. The cost of officer patrol time and vehicle operational and depreciation costs are counted as variable costs. The estimate is based on the following assumptions.

1 - 3 patrols per shift would be made in this area,

2 - 20 minutes would be the average time required to complete each patrol of the one mile of additional area,

3 - the average cost per officer including fringe benefits and all other expenses except transportation is $15,200, and

4 - additional vehicles would not be needed but 16¢ per mile is charged to the operation and depreciation of patrol cars and that 27 miles will be traveled daily in the area or 3 miles per trip.

Personnel costs:

1 - 3 patrols/shift times 3 shifts/day times 20 minutes/patrol = 3 hours/day

2 - 3/8 times $15,200 = $5,700

Vehicle costs: 27 miles times .16/mile times 365 = $1,577

Total Additional Costs: = $7,277

A third estimate can be obtained by comparing expenditures of similar cities with regression analysis. The regression analysis estimate for police protection was $6,154. This was derived by regressing a total expenditure for police services in 1976 against the city's population for 1976 for a random sample of 25 cities under the size of 50,000 population. The regression coefficient

for population was 30.77 indicating that each additional person added a cost of $30.77 to law enforcement expenses. This variable explains 59 percent of the change in expenditures. Since the standard error of the estimate was 5.32, we can be 95 percent confident that the true parameter is between the values of 20.12 and 41.40. This would yield annual increases of between $4024 and $8280. One disadvantage of this estimate is that it does not separate fixed and variable costs.

In summary, the best estimate appears to be the one which uses the budgeting procedure or $7277. The other estimates, however, do provide perspective on this estimate and they range from $3496 to $9123.

Fire Protection

Currently there are 23 employees in the Athens City Fire Department. The fire chief indicates that the department is currently short 3 employees with each one costing approximately $10,500. The fire chief indicated that if the number of employees was increased to 26, there would be no need for additional men or equipment to service the Route 56 area.[12/]

The per capita cost of fire fighting prevention, inspection and including pension, retirement and fringe benefits was $20 per capita in 1977.[13/] Assuming a 10 percent increase in cost for 1978 or $22 per capita, this would result in an additional $4,400 to service the Route 56 area. The regression results yielded a coefficient of 20.97 indicating that each additional person would add nearly $21 expense for fire protection. The standard error was 2.24 and this regression explains 79 percent of the variation

in expenditures in the sample.

These results would lead to an estimate of $4,200 in 1976 dollars. If the current wage adjustments increase costs by 15 percent, this would yield $4,830. The 95 percent confidence intervals indicate that we can be 95 percent sure that the true increase would be between $3,793 and $5,853.

Street Lighting and Maintenance

Currently the city of Athens has 60 miles of streets which it maintains.[14] In 1977 the average cost per mile for street lighting was $956 and for traffic lights $92.70. At these rates the additional cost for maintaining the mile of streets along Route 56 would be $1,049.

Street maintenance and repair and snow removal cost $1,231 per mile. Assuming that there are no changes for expenses for off-street parking meters and public transit systems, the additional annual costs of these street related expenditures would be $2,280.[15]

An alternative estimate of street maintenance was provided by Phil Goldsberry. This road might need to be resurfaced in two or three years at a cost of approximately $40,000. If this is the case, the annual cost, assuming 8 percent and 20 years, would be $4,074.[16]

Garbage Collection

It is assumed that the city will no longer be collecting garbage. However, if the city does not elect to discontinue garbage collection completely, it is unlikely that it would provide this service in the annexation area. Currently the city does not provide

garbage collection service past the Richland Avenue bridge even though this is within the city limits. However, if these assumptions are incorrect, it is assumed that the rate structure could be set so that the additional revenue will cover any additional expenses.[17]/

Water

The proposed annexation area is currently served by the Le Ax Water System with a six-inch main line. The static water pressure is 100 pounds per square inch. However, the Le Ax System lacks sufficient flow pressure to provide fire protection. To provide adequate volume and flow pressure, Le Ax would need to parallel a part of the main line along Route 56 and install a stand tank in the area.[18]/

The city's water treatment plant has a capacity of seven million gallons per day. In 1977 the average daily usage was 2.3 million gallons per day or 32 percent capacity. The peak demand in 1977 was four million gallons on September 1, or 57 percent of capacity. No additional personnel would be needed to handle increased volumes of water in the treatment plant.[19]/

The city has received a grant proposal to the Appalachian Regional Commission for extending water lines to the annexation area. The grant calls for an eight-inch line of approximately 6,000 lineal feet. The total cost was estimated at $117,000 in 1976 dollars. The grant provides 66.6 percent federal funding with the local share being paid for by special assessments on the property owners in the area. This suggests that no additional costs would be passed on to the city.

However, state law requires the city to contribute two percent, or $2340 of the capital cost.[20] Assuming a 20-year bond at eight percent interest, this would require annual payment of $238.33. The city's contribution might exceed two percent if some property owners default in their taxes. To cover this possibility, a five percent rate is assumed for an annual cost of $595.83.

There would be additional operation and maintenance costs for pumping water and maintaining the pumping stations and lines. The projected volume in this area is 26,000 gallons per day. Adding 30 percent contingency, this yields $7.90 per day or $2885 per year.

The Le Ax Water System estimates it will collect $8970 annually from the consumers already in this area, or $11,250 with the addition of additional development in this area.[21] In general, 80 percent of the revenue of rural water systems goes to service its debt for capital expenditures. Assuming 80 percent of the $8970 is allocated to service the system's debt, this equals $7176.

Le Ax is not set up under Ohio Revised Code Chapter 6103, so it appears that the city can legally supply water service to this area. However, if out of the sense of fairness or due to legal requirements the city assumed the debt service for the lines in this area, the cost would be approximately $7176.[22]

The option of purchasing the Le Ax lines is not feasible. The line is a main line between two major portions of the Le Ax service area. Second, the lines do not meet the city's standards and are inadequate for providing fire protection.

The additional annual costs for providing water service could range from $3480 to $10,565, depending on the compensation provided to Le Ax.

Sanitary Sewer

Package treatment plants will be used by Morrison and Beacon schools and Kerr's Distribution Center to handle sewage disposal. However, all three units have indicated a desire to have a central sewer system extended to the area.

A permit is required from the Ohio EPA for all commercial and industrial sewage disposal systems.[23] EPA is trying to consolidate the use of package treatment plants and prefers it when a local unit of government operates plants. If lots in an industrial park are sold, the seller of the property does not have authority to charge for sewage disposal. If the land is leased to an occupant, then the cost of the treatment can be included in the lease. However, EPA is discouraging this approach because it feels there are incentives to hold the lease cost as low as possible while not providing proper maintenance of the package treatment plants. The uncertainty concerning EPA approval for additional modules to the package treatment plant is a key question in the annexation issue.[24]

The Athens City Sewage Treatment Plant has a capacity of four million gallons a day. The average daily volume is 3.2 million gallons per day or 80 percent of capacity. Since the treatment plant has some excess capacity, no additional personnel will be needed with some expansion in volume.[25] There probably would be some increase in operation and maintenance expenses such as pumping costs, maintenance of pumping stations and maintenance of sewer lines. In 1977 the operation and maintenance cost per thousand gallons was $0.078. Assuming that the operation and maintenance

costs per thousand gallons average the same as the rest of the current system plus 10 percent for inflation, the additional O and M cost would be $1078 per year.

The ARC proposal assumes 96,000 gallons per day rather than the 34,000 assumed here. The higher estimate is based on an assumption of 1200 employees in this area rather than the 300 estimated in this report. While the higher estimate would increase the O and M cost, revenues would also increase. However, the capital cost estimated here remain unchanged.

The ARC grant proposal includes 5600 feet of twelve-inch sewer pipe, 5500 feet of 18-inch pipe and pumping stations at Margaret Creek and Hocking River. The total estimated cost is $603,200. The federal share would be 66.6 percent or $399,620. The local share of $203,580 would be paid by benefit assessment.

As with the water system, the city would be required to pay two percent of the project and might pay a higher percentage if there were defaults on the special assessments. Assuming that the city pays five percent of the project's capital costs, or $30,160, the annual charge for a 20-year eight percent loan would be $3072. At two percent the annual capital charge would only be $1228.

The total additional annual cost for sanitary sewer would be between $2306 and $4150, assuming additional operation and maintenance costs of $1078 and capital cost range between $1228 and $3072.

Indebtedness and Unencumbered Balances

Ohio law requires a city annexing an area to assume a portion of the indebtedness, "The apportionment shall be made in the pro-

portion of the total duplicate for the annexed territory transferred to the municipal corporation to the total tax duplicate remaining in and for the unannexed portion of the township." (ORC 709.12) The same procedure is used to allocate any unencumbered balances.

The township of Athens currently does not have any indebtedness, but it did have an unencumbered balance of $126,661 on January 1, 1978.[26/]

The duplicate for the proposed annexation area, including both real and tangible property, was $763,569 in 1977. This means that slightly over 4.2 percent of the unencumbered balances in township would be transferred to the city of Athens. This would result in the city of Athens receiving $5449 if the area was annexed.

Naturally, this estimate is based on the 1978 unencumbered balance and may change over time. Over the last several years the Athens Township has had an unencumbered balance of over $25,000 in its general fund. The unencumbered balance in the general fund for 1975 was $28,521.26; for 1976 it was $27,201.57; and for 1977 it was $25,390.53.

Summary

Table 1 summarizes the estimates for each service. As this table shows, no change in expenditures is assumed for several municipal services. The major ones which are assumed not to be affected by the proposed annexation are: recreation programs, community planning, off-street parking, public transit system, and functions in the general government program.

The first column of Table 1 gives the expected value for each service. The total for these five services is $21,992. This shows the estimated annual additional expenditure for these five municipal

Table 1

Estimates of Additional Annual
Expenditures for Municipal Services
in the Proposed Annexation Area - Route 56

Service	Estimated Annual Increase		
	Expected[1] Value	Low Value	High Value
Police	$ 7,277	$ 3,496	$ 9,123
Fire	4,830	3,793	5,853
Streets[2]	3,177	2,280	4,074
Water	3,480	3,480	10,656
Sewer	3,228	2,306	4,150
Total	$21,992	$15,355	$33,856

[1]This estimate appears to be the most probable. See the text for a discussion of the strengths and weaknesses of each estimate and the reasons for other estimates.

[2]Includes street and traffic lights, street maintenance and snow removal. The expected value $3,177 is an average of the high and low estimates.

services. When capital expenditures were involved, the annual cost was estimated assuming amortizing the loan over 20 years at eight percent interest. The water and sewer estimates include five percent of the capital cost for extending these lines as well as an estimate of the additional operation and maintenance costs for an average daily use of 34,000 gallons.

The expected value is based on the procedure which, in my judgement, yields the most defensible estimate. The estimation procedures used and their strengths and weaknesses are described in the text. Given the state of the art in forecasting expenditures, it is essential to understand the estimation procedure and the assumptions used in deriving the estimate. While the estimates vary considerably, they provide a range which is useful for comparison with the changes in expected revenues.

Revenues to the city are estimated to increase from $43,183 to $53,294.[27/] This results in a net gain to the city of between $9,327 and $37,939 with an expected gain of $26,246.

From a fiscal prospective alone the annexation is advantageous to the city. This does not imply that future annexations would also be advantageous. Nor does it imply that an annexation proposed should necessarily be rejected solely because an analysis indicates slightly higher taxes would result. The encouragement of new employment opportunities might be an important enough priority to outweigh possible negative fiscal impacts of an annexation. Some non-economic considerations may also be relevant. Setting priorities on competing community goals is the responsibility of elected officials. The fiscal and employment estimates developed in this study provide one set of data needed for this decision.

NOTES

1. Research using this approach was done in Southeast Ohio by Alan Osman and reported in a research bulletin entitled "Income and Fiscal Impacts of Manufacturing Plants in Southeast Ohio" by George Morse and Leroy Hushak, Department of Agricultural Economics and Rural Sociology, Ohio Agricultural Research and Development Center and The Ohio State University, August 1978.

2. Excess capacity in a service exists whenever the current resources are not being fully utilized. If more people can be served using the same level of resources, with no reduction in quantity or quality of services provided to the current population, then excess capacity exists.

3. Economies of scale or size in a service means that the average cost per unit (or per capita) declines as the number of units or people increase.

4. Muller, Thomas, Fiscal Impacts of Land Development: A Critique of Methods and Review of Issues, The Urban Institute, Washington, D. C., 1975.

   Reference 10 refers to Burchell, Robert W., Planned Unit Development - New Communities American Style, Center for Urban Policy Research, New Brunswick, Rutgers University, 1972.

   Reference 72 is Montgomery County Planning Board, Fiscal Impact Analysis, Stage 1 - Germantown Master Plan, Final Report, 1974.

5. An example of research used in this approach is a bulletin entitled "Economic Changes from Industrial Development in Eastern Oklahoma" by Ron Shaffer and Luther Tweeten, Oklahoma State University, Bulletin B-715, July 1974.

6. Werner C. Hirsch reviews economies of scale studies in his book The Economics of State and Local Government, McGraw-Hill, 1970. While there appear to be no economies of scale for elementary and secondary education, there is some evidence that police protection, garbage collection and disposal, fire protection and sewage do provide economies of scale. However, the research on this question is still in the development stage.

7. For a non-technical discussion of regression analysis, see the book Survey Research Methods by Earl R. Babbie, Wadsworth Publishing Company, 1973 or Applied Econometrics by Potluri Rao and Roger LeRoy Miller, University of Washington, Wadsworth Publishing Company, 1971.

8. Doeksen, Gerald A., et al., "Economics of Rural Ambulance Service in the Great Plains", Agricultural Economics Report No. 308, Economic Research Service, USDA, Washington, D. C., 1975.

Schmidt, Joseph F., Gerald A. Doeksen, "The Economics of Law Enforcement in the Great Plains," Agricultural Information Bulletin in Progress, Economic Research Service, USDA, 1977.

Childs, Dan, et al., "Economics of Rural Fire Protection in the Great Plains," Agricultural Information Bulletin No. 407, Economic Research Service, USDA, Washington, D. C., 1977.

Schmidt, Joseph F., Gerald A. Doeksen, Jack Frye and John C. Maxey, "Analyzing the Feasibility of Rural Rental Apartments in the Great Plains: A Guide for Local Decision Makers," Economic Research Bulletin, 1977.

Blalock, Gale, Gerald A. Doeksen, Greg Throckmorton, and Jim Nelson, "Industrial Sites: Costs and Alternative Financial Sources," Oklahoma State Extension Fact Sheet, 1976.

King, Richard A. and G. Bryan Wall, "Estimation of Cost - Quality - Quantity Relationships," printed in National Conference on Non-Metropolitan Community Services Research, Committee Print for the Committee on Agriculture, Nutrition, and Forestry, United States Senate, U. S. Government Printing Office, July 12, 1977.

9. Information provided by Chief of Police Theodore Jones; Director of Ohio University Security, Robert Guinn; and Athens County Sheriff, Gary Efaw.

10. Correspondence with Chief of Police Jones, September 5, 1978.

11. The number of police officers per 1,000 residents varies considerably in other Southeastern Ohio counties. In several nearby counties the ratio of police officers (including municipal police, county sheriffs and State Highway Patrol) per 1,000 residents are: Jackson - 1.22; Pike - 0.90; Ross - 1.23; Scioto - 1.00; Vinton - 2.12; and Gallia - 1.97. These data are reported by Battelle Columbus Laboratories in Socioeconomic Effects of the DOE Gas Centrifuge Enrichment Plant Draft Final Report Volume I - Methodology and Analysis, March 24, 1978.

12. Information provided by Fire Chief Chad Cooley.

13. Obtained from the State Auditor's Report on Receipt and Expenditures for the City of Athens, 1977.

    The population estimate used was 20,000. The most recent official estimate by the Bureau of Census was 19,735 for July 1, 1975, including OU students living in Athens.

14. Information provided by Margaret Topping, Athens City Auditor.

15. Richard Woodruff estimated that his department needed three additional people to handle their current area but that the addition of Route 56 would not require any new personnel.

16. Information provided by Phil Goldsberry, Athens City Service-Safety Director.

17. Background information on this service was provided by George Weisenbach.

18. Information provided by Dick Shaw, President, Le Ax Water Distribution Corporation and George Mara, Consulting Engineer.

19. Information provided by Drennen Goldsberry.

20. Information provided by Phil Goldsberry. See ORC 727.05.

21. Information provided by Jean White, Secretary-Treasurer of the Le Ax Water Distribution Corporation.

22. It has been reported that the city signed agreements with some rural water systems pledging not to expand into their service areas but we have no information on this concerning Le Ax.

23. See ORC 6111.44.

24. Information provided by Robert Cottrill, Ohio EPA Office, Logan.

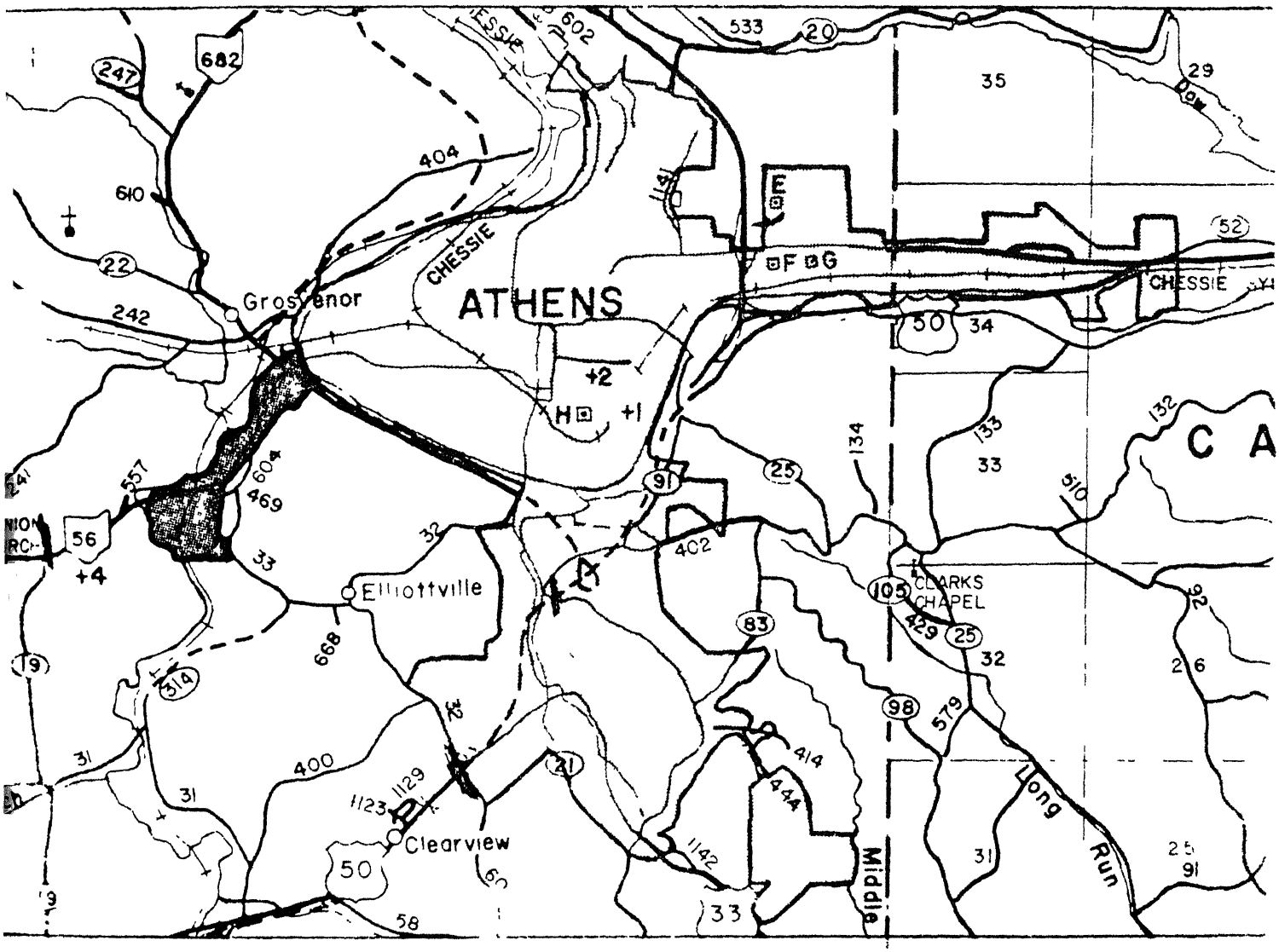
25. Information provided by Walt Ackerman, Athens Sewer Treatment Plant Superintendent.

26. Information provided by Pete Couladis, Athens County Auditor.

27. See the companion paper "Fiscal and Employment Impacts of Athens' Proposed Route 56 Annexation", George Morse, November 1978.

Appendix A

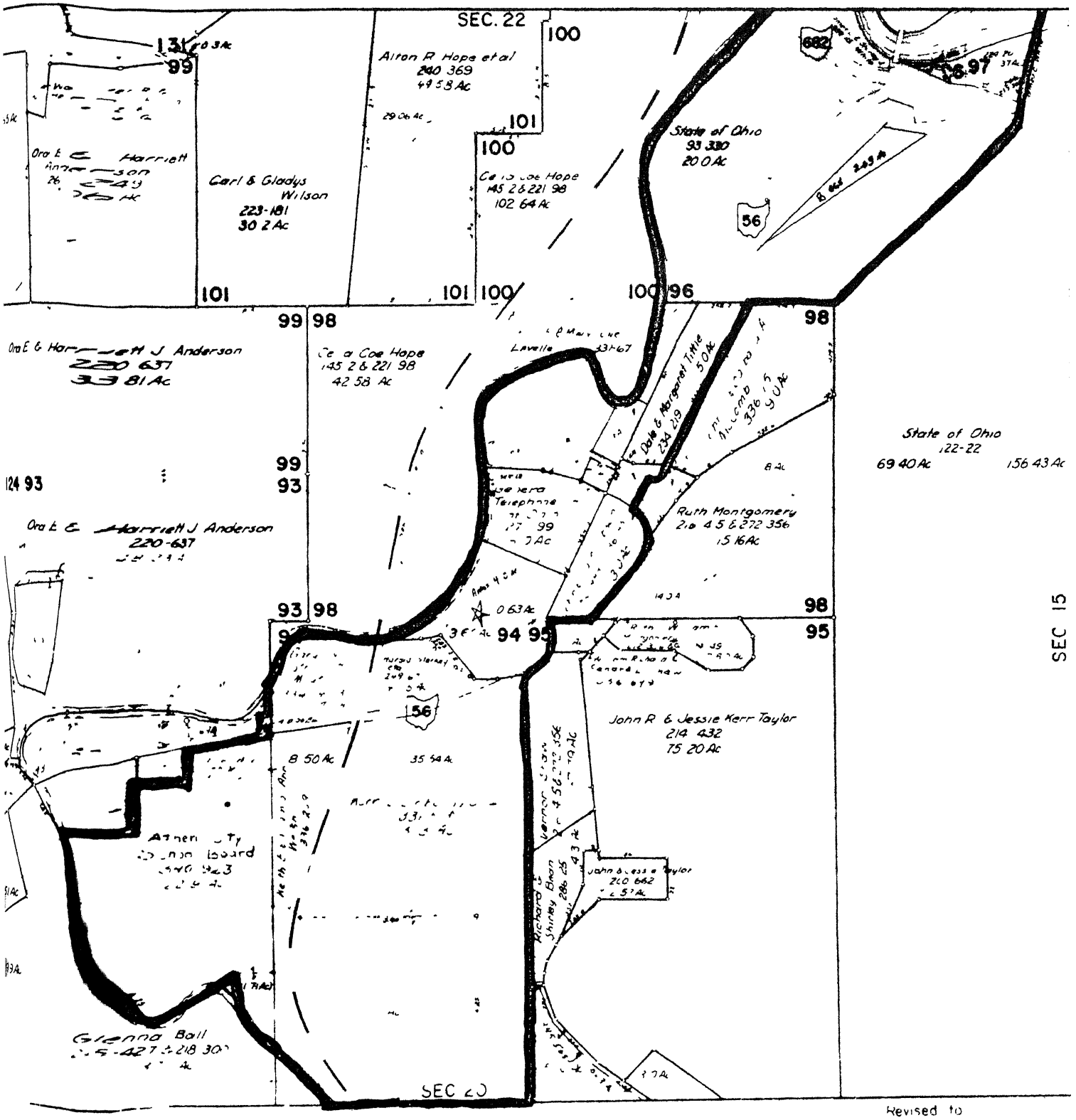
MAP OF THE PROPOSED ANNEXATION
AREA OF ROUTE 56 WEST
OF ATHENS



The proposed annexation area includes the 194 acres shaded darker along Route 56.

ATHENS COUNTY AUDITOR TAX PLAT
Approx Scale 1" = 400' or 6 Chains

SEC. 21
Athens Twp
T9 - R14



Revised to